



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/046,715	01/17/2002	Yasuyuki Anami	04739.0074	4891
22852	7590	12/02/2009	EXAMINER	
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413			PROCTOR, JASON SCOTT	
ART UNIT		PAPER NUMBER		
2123				
MAIL DATE		DELIVERY MODE		
12/02/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/046,715	ANAMI ET AL.	
	Examiner	Art Unit	
	JASON PROCTOR	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 26 August 2009.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1,2 and 5-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1,2 and 5-22 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____ .
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)	5) <input type="checkbox"/> Notice of Informal Patent Application
Paper No(s)/Mail Date _____ .	6) <input type="checkbox"/> Other: _____ .

DETAILED ACTION

Claims 1-21 were rejected in the Office Action entered on 1 June 2009.

Applicants' response submitted on 26 August 2009 has amended claims 1, 2, 7, 9, 11-14, and 17-20; canceled claims 3 and 4; and presented new claim 22. Claims 1-2 and 5-22 are pending in this application.

Claims 1-2 and 5-22 are rejected.

Response to Remarks - 35 USC § 102

1. In response to the previous rejection of claims 1-21 under 35 U.S.C. § 102(b) as being anticipated by Sebastian, Applicants argue primarily that:

Sebastian does not disclose computation of at least one technical characteristic that comprises "analyzing the strength of [a] combined shape model," as recited in claim 1 and similarly recited in claims 2, 7, 9, 11-15, and 17-20.

This argument has been fully considered and found persuasive. Therefore, in response to the newly claimed feature, the previous rejection is withdrawn. New grounds of rejection are entered below.

2. In response to newly presented claim 22, Applicants remark primarily that:

Furthermore, the cited reference does not disclose or suggest the subject matter recited in new claim 22. For example, Sebastian does not disclose or suggest "a control section configured to ... create a corresponding surface group in accordance with user input of a correspondence to determine if there are errors in the combined shaped model arising from the second reference surface; wherein the errors capable of being determined using the corresponding surface group include at least one of a change of a number of configuring surfaces, a change in direction or quantity of border lines, reversal of a direction of a surface, and folding of a surface," as recited in claim 22. Accordingly, new claim 22 should be allowable.

The Examiner respectfully traverses this rejection as follows.

Applicants' remarks illustrate how this claim language does not positively recite a feature of the invention. The claim language specifies that the errors *capable of being determined* include those recited examples. The claim does not specify a computer performing a step of determining an error. Of course, these types of errors are *capable of being determined* using the system and method of Sebastian, because there is no evidence, teaching, or suggestion in Sebastian that *prohibits* a user from determining those errors using Sebastian's teachings. Therefore, Sebastian anticipates the plain and ordinary meaning of the claim language by disclosing a system where the claimed errors are *capable of being determined*. Accordingly, new claim 22 is rejected below as being anticipated by Sebastian.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 22 is rejected under 35 U.S.C. § 102(b) as being anticipated by US Patent No. 5,552,995 to Sebastian.

A design support system [(abstract); “*...the present invention is implemented in the ‘C++’ programming language and uses Pro-Engineer from Parametric Technology Inc. as its solid modeling and front-end CAD system.*” (column 11, lines 21-26); “*The present invention enables a designer to create feature templates and store them in a feature template library.*” (column 13, lines 44-46)], comprising:

a database (FIG. 2, reference 34) which divides a history of design work for creating a shape model, comprising a first reference surface, for each part of the shape model and holds a plurality of design work histories as unit work history data [*The template scheme provides a uniform data handling mechanism that spans the domain of part, tooling, process and material. The templates of the present invention allow the collection, under a single header, of various types of information: fixed parameters (e.g., user supplied data), parameters derived by relationship with other parameters from the same template (e.g., a boss' outer diameter computed from the value of its own inner diameter), parameters derived by relationship with parameters from other templates in the same domain (e.g., a boss' height computed from the thickness of the wall to which it is attached), and parameters derived by relationship with parameters from other templates in other domains (e.g., a boss' draft angle computed from the tool orientation relative to the boss).*” (column 11, lines 32-49)]; and

a control section configured to:

fetch at least two unit work history data selected from the plurality of unit work history data held by the database [*An example of a feature template is a “support::tapered wall” feature template, wherein the primitive object is a tapered wall and the function of the tapered wall is support. Another example is a “support::rib” feature template that represents a type of projection known as a rib, where the rib has a support function. A tapered wall and a rib can be regarded as sub-parts that can be used to make a part.*” (column 12, lines 3-11)];

combine the at least two selected unit work history data and output design work data for creating a combined shape model, comprising a second reference surface, which is

formed by joining part shape models corresponding to the respective unit work history data (column 12, lines 3-11; column 11, line 55 – column 12, line 3); and

create a corresponding surface group in accordance with user input of a correspondence to determine if there are errors in the combined shape model arising from the second reference surface [See column 22, *et seq.*, in particular: *"The designer starts by instantiating the nominal wall feature and uses the add-on operation to provide "Fasten" functionality. In this example, the system searches for a function template using "Fasten" as the search criteria and provides the user with the boss feature. The user specifies the parameters for the boss such as dimension and positioning information. Based on the selection, the reasoning attributes of the feature template are evaluated and the system examines the appropriate constraints. The constraints retrieve necessary additionally information from other feature templates, look-up tables and the material database 90. The constraints that pertain to the feature "boss" are evaluated, and it is found that the thickness of the boss is adequate to support the applied load. However, while considering the mold fill criteria, the thickness exceeds the manufacturer's recommendation (as retrieved from the manufacturer's external database) for the selected material. Depending on the constraint evaluation results, the user is notified through one of the following mechanisms: warning messages, error messages and design change recommendations... In the boss example, the system notifies the user that the "BOSS IS TOO THICK" and recommends a range of appropriate thickness values for the selected material that satisfies both the mold fill and the strength criteria."* (column 22, line 18, *et seq.*)];

wherein the errors capable of being determined using the corresponding surface group include at least one of a change of a number of configuring surfaces, a change in direction

or quantity of border lines, reversal of a direction of a surface, and folding of a surface [Sebastian does not include any teaching or suggestion that that *prohibits* these errors from being determined. Therefore, according to the claim language, these errors are *capable of being determined* by Sebastian's method and system.].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. § 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was

made in order for the examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. § 102(e), (f) or (g) prior art under 35 U.S.C. § 103(a).

4. Claims 1-2 and 5-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over US Patent No. 5,552,995 to Sebastian in view of US Patent No. 4,858,146 to Shebini.

Regarding claim 1, Sebastian teaches:

A design support system [(abstract); “*...the present invention is implemented in the ‘C++’ programming language and uses Pro-Engineer from Parametric Technology Inc. as its solid modeling and front-end CAD system.*” (column 11, lines 21-26); “*The present invention enables a designer to create feature templates and store them in a feature template library.*” (column 13, lines 44-46)], comprising:

database (FIG. 2, reference 34) which divides a history of design work for creating a shape model for each part of the shape model and holds a plurality of design work histories as unit work history data [“*The template scheme provides a uniform data handling mechanism that spans the domain of part, tooling, process and material. The templates of the present invention allow the collection, under a single header, of various types of information: fixed parameters (e.g., user supplied data), parameters derived by relationship with other parameters from the same template (e.g., a boss’ outer diameter computed from the value of its own inner diameter), parameters derived by relationship with parameters from other templates in the same domain (e.g., a boss’ height computed from the thickness of the wall to which it is attached), and parameters derived by relationship with parameters from other templates in other domains (e.g.,*

a boss' draft angle computed from the tool orientation relative to the boss)." (column 11, lines 32-49)]; and

a control section configured to fetch at least two unit work history data selected from the plurality of unit work history data held by the database ["An example of a feature template is a "support::tapered wall" feature template, wherein the primitive object is a tapered wall and the function of the tapered wall is support. Another example is a "support::rib" feature template that represents a type of projection known as a rib, where the rib has a support function. A tapered wall and a rib can be regarded as sub-parts that can be used to make a part." (column 12, lines 3-11)]; and

combine at least two selected unit work history data and output design work data for creating a combined shape model which is formed by joining part shape models corresponding to the respective unit work history data (column 12, lines 3-11; column 11, line 55 – column 12, line 3).

Shebini teaches a database accumulating technical conditions, which are to be met by a part shape model to be created according to each unit work history data, in association with each unit work history data ["Turning to very particular structures, namely off-shore platforms, we see that they must be structurally adequate for operational and environmental loading, practical to construct, and be cost effective. The selection of a configuration is based on functional requirements and methods of installation." (Shebini, column 3, lines 60-65); "Once environmental loads are determined, they are combined with operational loads, and an estimate is made of the resulting pile mudline moments and axial forces." (Shebini, column 4, lines 33-39); "Before the design solution of either the 3-dimensional "finite Element" analysis of the

superstructure and jacket, or the beam-column analysis of the piling can be considered finished, it is necessary to determine compatible conditions at the pilehead-structure interface. These equilibrium conditions are usually obtained using an interaction analysis procedure which yields the combined response of the linear structure and its non-linear soil-pile foundation for nay imposed static load condition." (Shebini, column 4, lines 55-65); et cetera. Shebini provides

numerous examples of the "technical conditions" that are accumulated in columns 3 and 4]; and

computing at least one technical characteristic value of the combined shape model which is created from the output design work data [*"The equilibrium conditions determined from the interaction analysis are now imposed on the structural Model in combination with appropriate design loads, and a static analysis is performed. The internal member forces determined in this analysis are employed to check the stress levels in the members."* (Shebini, column 4, line 65 - column 5, line 2)]; and

comparing the computed technical characteristic value with the technical conditions related to unit work history data which is the origin of the design work data [*"The stresses are compared to allowable stresses, as set forth in the design basis, and members resized accordingly."* (Shebini, column 5, lines 2-5)];

wherein the computation of the at least one technical characteristic value comprises analyzing the strength of the combined shape model [*"stress levels in the members"* (Shebini, column 4, line 65 - column 5, line 5)].

Sebastian and Shebini are analogous art because both are drawn to structural modeling.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini as expressly motivated

by Shebini in order to predict the structural properties of the assembled product [*"Nowadays, by using the Finite Element Method (FEM), stress analysts do not have to modify the problem to conform to available solutions. No matter how complex the shape or system of loads may be, the (FEM) treats a loaded structure as being built of numerous tiny connected substructures or elements as are shown in FIG. 8. Since these elements can be put together in virtually any fashion, they can be arranged in simulate exceedingly complex shapes. Thus, the (FEM) can be used to determine stresses for structural parts where no mathematically closed form solution exists."* (Shebini, column 1, lines 25-35)]. The combination could be achieved by using Shebini's structural analysis method to analyze the model described by Sebastian.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini to arrive at the invention specified in claim 1.

Regarding claim 2, Sebastian teaches:

A design support system which outputs work data for creating a shape model, comprising a first reference surface, of a design target in order to create the shape model of the design target conforming to a standard shape [(abstract); (column 11, lines 32-49)], comprising:

A database which holds a plurality of unit work history data which are obtained by dividing a history of a design work performed with reference to a first standard shape for each design work history corresponding to a shape model of a predetermined portion (column 11, lines 32-49);

A control section configured to receive designation of data about a second standard shape (FIG. 2, reference 35);

Fetch multiple unit work history data selected from the multiple unit work history data held by the database (column 12, lines 3-11); and

combine each of the fetched unit work history data, reproduce design work with reference to the designated second standard shape for the design works performed with reference to the first standard shape among the design works contained in the unit work history data, and output work data corresponding to a combined shape model, comprising a second reference surface conforming to the second standard shape [(column 11, lines 32-49); (column 11, line 55 - column 12, line 11)]; and

create a corresponding surface group in accordance with user input of a correspondence to determine if there are errors in the combined shape model arising from the second reference surface [See column 22, *et seq.*, in particular: *"The designer starts by instantiating the nominal wall feature and uses the add-on operation to provide "Fasten" functionality. In this example, the system searches for a function template using "Fasten" as the search criteria and provides the user with the boss feature. The user specifies the parameters for the boss such as dimension and positioning information. Based on the selection, the reasoning attributes of the feature template are evaluated and the system examines the appropriate constraints. The constraints retrieve necessary additionally information from other feature templates, look-up tables and the material database 90. The constraints that pertain to the feature "boss" are evaluated, and it is found that the thickness of the boss is adequate to support the applied load. However, while considering the mold fill criteria, the thickness exceeds the manufacturer's recommendation (as*

retrieved from the manufacturer's external database) for the selected material. Depending on the constraint evaluation results, the user is notified through one of the following mechanisms: warning messages, error messages and design change recommendations... In the boss example, the system notifies the user that the "BOSS IS TOO THICK" and recommends a range of appropriate thickness values for the selected material that satisfies both the mold fill and the strength criteria." (column 22, line 18, et seq.)].

Shebini teaches the database accumulating technical conditions, which are to be met by a part shape model to be created according to each unit work history data, in association with each unit work history data [*"Turning to very particular structures, namely off-shore platforms, we see that they must be structurally adequate for operational and environmental loading, practical to construct, and be cost effective. The selection of a configuration is based on functional requirements and methods of installation."* (Shebini, column 3, lines 60-65); *"Once environmental loads are determined, they are combined with operational loads, and an estimate is made of the resulting pile mudline moments and axial forces."* (Shebini, column 4, lines 33-39); *"Before the design solution of either the 3-dimensional "finite Element" analysis of the superstructure and jacket, or the beam-column analysis of the piling can be considered finished, it is necessary to determine compatible conditions at the pilehead-structure interface. These equilibrium conditions are usually obtained using an interaction analysis procedure which yields the combined response of the linear structure and its non-linear soil-pile foundation for any imposed static load condition."* (Shebini, column 4, lines 55-65); et cetera. Shebini provides numerous examples of the "technical conditions" that are accumulated in columns 3 and 4];

computing at least one technical characteristic value of the combined shape model which is created from the output work data [*"The equilibrium conditions determined from the interaction analysis are now imposed on the structural Model in combination with appropriate design loads, and a static analysis is performed. The internal member forces determined in this analysis are employed to check the stress levels in the members."* (Shebini, column 4, line 65 - column 5, line 2)]; and

compare the computed technical characteristic value with technical conditions related to unit work history data which is the origin of the work data [*"The stresses are compared to allowable stresses, as set forth in the design basis, and members resized accordingly."* (Shebini, column 5, lines 2-5)];

wherein the computation of the at least one technical characteristic value comprises analyzing the strength of the combined shape model [*"stress levels in the members"* (Shebini, column 4, line 65 - column 5, line 5)].

Sebastian and Shebini are analogous art because both are drawn to structural modeling.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini as expressly motivated by Shebini in order to predict the structural properties of the assembled product [*"Nowadays, by using the Finite Element Method (FEM), stress analysts do not have to modify the problem to conform to available solutions. No matter how complex the shape or system of loads may be, the (FEM) treats a loaded structure as being built of numerous tiny connected substructures or elements as are shown in FIG. 8. Since these elements can be put together in virtually any fashion, they can be arranged in simulate exceedingly complex shapes. Thus, the (FEM) can be*

used to determine stresses for structural parts where no mathematically closed form solution exists." (Shebini, column 1, lines 25-35)]. The combination could be achieved by using Shebini's structural analysis method to analyze the model described by Sebastian.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini to arrive at the invention specified in claim 2.

Regarding claim 5, Sebastian teaches:

The design support system according to claim 2, wherein the control section is further configured to receive designation of data about a third standard shape (FIG. 2, reference 35); wherein:

The work data is converted by reproducing a design work with reference to the designated third standard shape for work included in the work contained in the output work data and performed with reference to the second standard shape, and converted work data corresponding to a shape model conforming to the third standard shape is output [(column 11, lines 32-49); (column 12, lines 3-11)].

Regarding claim 6, Sebastian teaches:

The design support system according to claim 1, wherein the control section is further configured to analyze the history of design work and extract input work carried out by a person in charge of work when unit historical data is created [*"CreateT... creates a new template..."* (column 21, lines 50-55, etc.)]; and the design support system further including:

A display section which shows the extracted input work to the person in charge of work to request input of design support information [*In this example, the system searches for a function template using “Fasten” as the search criteria and provides the user with the boss feature.*” (column 22, lines 21-28); *At any time the user has the ability to modify the feature attribute values and the system processes the effect of these changes...*” (column 22, lines 57-65)]; and

A database which records the design support information in a history of the design work and divides the history of the design work into unit historical data when the design support information is input so to show when the design support information is reused (column 22, lines 41-65).

Regarding claim 7, Sebastian teaches:

A design support system which holds a series of design work histories to reuse as work history data and creates a shape based on the work history data [(abstract); (column 11, lines 32-49); (column 12, lines 3-11)], comprising:

A control section which analyzes the work history data to extract input work carried out by a person in charge of work [(column 11, lines 32-49), (column 21, lines 50-55, etc.)];

A display section which shows the extracted input work to the person in charge of work to request input of design support information (column 22, lines 21-65); and

A database which records the design support information in the work history data when the design support information is input so to show when the design support information is reused (column 22, lines 41-65).

Shebini teaches the database accumulating technical conditions, which are to be met by the shape created based on the work history data, in association with the work history data [*"Turning to very particular structures, namely off-shore platforms, we see that they must be structurally adequate for operational and environmental loading, practical to construct, and be cost effective. The selection of a configuration is based on functional requirements and methods of installation."* (Shebini, column 3, lines 60-65); *"Once environmental loads are determined, they are combined with operational loads, and an estimate is made of the resulting pile mudline moments and axial forces."* (Shebini, column 4, lines 33-39); *"Before the design solution of either the 3-dimensional "finite Element" analysis of the superstructure and jacket, or the beam-column analysis of the piling can be considered finished, it is necessary to determine compatible conditions at the pilehead-structure interface. These equilibrium conditions are usually obtained using an interaction analysis procedure which yields the combined response of the linear structure and its non-linear soil-pile foundation for nay imposed static load condition."* (Shebini, column 4, lines 55-65); et cetera. Shebini provides numerous examples of the "technical conditions" that are accumulated in columns 3 and 4];

computing at least one technical characteristic value of the shape which is created based on the work history data [*"The equilibrium conditions determined from the interaction analysis are now imposed on the structural Model in combination with appropriate design loads, and a static analysis is performed. The internal member forces determined in this analysis are employed to check the stress levels in the members."* (Shebini, column 4, line 65 - column 5, line 2)]; and

comparing the computed technical characteristic value with technical conditions related to work history data which is the origin of the work data [*"The stresses are compared to allowable stresses, as set forth in the design basis, and members resized accordingly."* (Shebini, column 5, lines 2-5)];

wherein the computation of the at least one technical characteristic value comprises analyzing the strength of the shape [*"stress levels in the members"* (Shebini, column 4, line 65 - column 5, line 5)].

Sebastian and Shebini are analogous art because both are drawn to structural modeling.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini as expressly motivated by Shebini in order to predict the structural properties of the assembled product [*"Nowadays, by using the Finite Element Method (FEM), stress analysts do not have to modify the problem to conform to available solutions. No matter how complex the shape or system of loads may be, the (FEM) treats a loaded structure as being built of numerous tiny connected substructures or elements as are shown in FIG. 8. Since these elements can be put together in virtually any fashion, they can be arranged in simulate exceedingly complex shapes. Thus, the (FEM) can be used to determine stresses for structural parts where no mathematically closed form solution exists."* (Shebini, column 1, lines 25-35)]. The combination could be achieved by using Shebini's structural analysis method to analyze the model described by Sebastian.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini to arrive at the invention specified in claim 7.

Regarding claim 8, Sebastian teaches:

The design support system according to claim 7, wherein the database is further configured to generate unit work history data by dividing the work history data into predetermined work units for a design target (column 21, lines 50-55, etc.).

Regarding claim 9, Sebastian teaches:

A design support system (abstract), comprising:

A database which accumulates unit work history data which is formed by dividing a history of past design work into work units determined for a design target and contains design support information related to input work among the design work [(column 11, lines 32-49); (column 12, lines 3-11)];

A control section configured to selectively show the unit work history on a display section upon receiving designation of the design target [(column 22, lines 21-65) alternatively (column 16, lines 19-47)];

Create a shape by sequentially reproducing the selected unit work history [(column 11, lines 32-49); (column 12, lines 3-11)];

Provide design support information related to input work when the input work is demanded while the unit work history is being reproduced [(column 22, lines 21-65) alternatively (column 16, lines 19-47)]; and

Shebini teaches the database accumulating technical conditions, which are to be met by the part shape model to be created based on each work history data, in association with each

work history data [*"Turning to very particular structures, namely off-shore platforms, we see that they must be structurally adequate for operational and environmental loading, practical to construct, and be cost effective. The selection of a configuration is based on functional requirements and methods of installation."* (Shebini, column 3, lines 60-65); *"Once environmental loads are determined, they are combined with operational loads, and an estimate is made of the resulting pile mudline moments and axial forces."* (Shebini, column 4, lines 33-39); *"Before the design solution of either the 3-dimensional "finite Element" analysis of the superstructure and jacket, or the beam-column analysis of the piling can be considered finished, it is necessary to determine compatible conditions at the pilehead-structure interface. These equilibrium conditions are usually obtained using an interaction analysis procedure which yields the combined response of the linear structure and its non-linear soil-pile foundation for any imposed static load condition."* (Shebini, column 4, lines 55-65); et cetera. Shebini provides numerous examples of the "technical conditions" that are accumulated in columns 3 and 4]; computing at least one technical characteristic value of the shape which is created based on the work history data [*"The equilibrium conditions determined from the interaction analysis are now imposed on the structural Model in combination with appropriate design loads, and a static analysis is performed. The internal member forces determined in this analysis are employed to check the stress levels in the members."* (Shebini, column 4, line 65 - column 5, line 2)]; and

comparing the computed technical characteristic value with technical conditions related to work history data which is the origin of the work data [*"The stresses are compared to*

allowable stresses, as set forth in the design basis, and members resized accordingly." (Shebini, column 5, lines 2-5)];

wherein the computation of the at least one technical characteristic value comprises analyzing the strength of the shape [*"stress levels in the members"* (Shebini, column 4, line 65 - column 5, line 5)].

Sebastian and Shebini are analogous art because both are drawn to structural modeling.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini as expressly motivated by Shebini in order to predict the structural properties of the assembled product [*"Nowadays, by using the Finite Element Method (FEM), stress analysts do not have to modify the problem to conform to available solutions. No matter how complex the shape or system of loads may be, the (FEM) treats a loaded structure as being built of numerous tiny connected substructures or elements as are shown in FIG. 8. Since these elements can be put together in virtually any fashion, they can be arranged in simulate exceedingly complex shapes. Thus, the (FEM) can be used to determine stresses for structural parts where no mathematically closed form solution exists."* (Shebini, column 1, lines 25-35)]. The combination could be achieved by using Shebini's structural analysis method to analyze the model described by Sebastian.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini to arrive at the invention specified in claim 9.

Regarding claim 10, Sebastian teaches:

The design support system according to claim 9, wherein the control section is further configured to judge whether the work history to be reproduced agrees with predetermined guidance display conditions while the unit work history is being reproduced (column 22, lines 21-65); and wherein

The display section is further configured to implement a guidance display determined in connection with the guide display conditions if the work history agrees with the guidance display conditions (column 22, lines 21-65).

Regarding claim 11, Sebastian teaches:

A database which accumulates unit work history data which is formed by dividing a history of past design work into work units determined for a design target and contains design support information related to an input work among the design work [(abstract); (column 11, lines 32-49); (column 12, lines 3-11)];

A first display device which shows a shape of the design target obtained by sequentially reproducing a history of the design work with reference to the unit work history data [*“The representative embodiment supports, amongst others, the following interfaces: to CAD systems – IGES, Pro-Engineer and IDEAS; for FEM structural analysis – PATRAN/NASTRAN and IDEAS; for FEM molding filling, cooling and shrinkage analysis – C-FLOW, IDEAS, Moldflow and TMC; and for tool design – IDEAS, Pro-Engineer and DME Moldbase Catalog.”* (column 18, lines 35-41)];

A second display device which shows design support information contained in the unit work history data by reproducing a history of the design work prior to the reproduction at the first display device [(column 18, lines 35-41); (column 11, lines 21-26)]; and

a control section which creates a corresponding surface group in accordance with user input of a correspondence to determine if there are errors in the shape arising from *said* second reference surface (column 22, line 18, *et seq.*).

Shebini teaches the database accumulating technical conditions, which are to be met by the part shape model to be created based on each work history data, in association with each work history data [*"Turning to very particular structures, namely off-shore platforms, we see that they must be structurally adequate for operational and environmental loading, practical to construct, and be cost effective. The selection of a configuration is based on functional requirements and methods of installation."* (Shebini, column 3, lines 60-65); *"Once environmental loads are determined, they are combined with operational loads, and an estimate is made of the resulting pile mudline moments and axial forces."* (Shebini, column 4, lines 33-39); *"Before the design solution of either the 3-dimensional "finite Element" analysis of the superstructure and jacket, or the beam-column analysis of the piling can be considered finished, it is necessary to determine compatible conditions at the pilehead-structure interface. These equilibrium conditions are usually obtained using an interaction analysis procedure which yields the combined response of the linear structure and its non-linear soil-pile foundation for any imposed static load condition."* (Shebini, column 4, lines 55-65); et cetera. Shebini provides numerous examples of the "technical conditions" that are accumulated in columns 3 and 4];

computing at least one technical characteristic value of the shape which is created based on the work history data [*"The equilibrium conditions determined from the interaction analysis are now imposed on the structural Model in combination with appropriate design loads, and a static analysis is performed. The internal member forces determined in this analysis are employed to check the stress levels in the members."* (Shebini, column 4, line 65 - column 5, line 2)]; and

comparing the computed technical characteristic value with technical conditions related to work history data which is the origin of the work data [*"The stresses are compared to allowable stresses, as set forth in the design basis, and members resized accordingly."* (Shebini, column 5, lines 2-5)];

wherein the computation of the at least one technical characteristic value comprises analyzing the strength of the shape [*"stress levels in the members"* (Shebini, column 4, line 65 - column 5, line 5)].

Sebastian and Shebini are analogous art because both are drawn to structural modeling.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini as expressly motivated by Shebini in order to predict the structural properties of the assembled product [*"Nowadays, by using the Finite Element Method (FEM), stress analysts do not have to modify the problem to conform to available solutions. No matter how complex the shape or system of loads may be, the (FEM) treats a loaded structure as being built of numerous tiny connected substructures or elements as are shown in FIG. 8. Since these elements can be put together in virtually any fashion, they can be arranged in simulate exceedingly complex shapes. Thus, the (FEM) can be*

used to determine stresses for structural parts where no mathematically closed form solution exists." (Shebini, column 1, lines 25-35)]. The combination could be achieved by using Shebini's structural analysis method to analyze the model described by Sebastian.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini to arrive at the invention specified in claim 11.

Regarding claim 12, Sebastian teaches:

A design support method using a computer, wherein:

A series of design work histories is held in multiple quantities as work history data comprising a first reference surface in a database in order to create a part shape model [(abstract); (column 11, lines 32-49); (column 12, lines 3-11); (column 13, lines 44-46)];

At least two selected history data are fetched from the held multiple work history data according to an instruction input to a processor (column 22, lines 21-65); and

Design work data for creating a one-piece shape model by combining the at least two fetched work history data and connecting part shape models corresponding to the respective work history data is output (column 11, line 32 - column 12, line 11); and

a corresponding surface group is created by a control section in accordance with user input of a correspondence to determine if there are errors in the one-piece shape model arising from the second reference surface (column 22, line 18, *et seq.*).

Shebini teaches the database accumulating technical conditions, which are to be met by the part shape model to be created according to each work history data, in association with each

work history data [*"Turning to very particular structures, namely off-shore platforms, we see that they must be structurally adequate for operational and environmental loading, practical to construct, and be cost effective. The selection of a configuration is based on functional requirements and methods of installation."* (Shebini, column 3, lines 60-65); *"Once environmental loads are determined, they are combined with operational loads, and an estimate is made of the resulting pile mudline moments and axial forces."* (Shebini, column 4, lines 33-39); *"Before the design solution of either the 3-dimensional "finite Element" analysis of the superstructure and jacket, or the beam-column analysis of the piling can be considered finished, it is necessary to determine compatible conditions at the pilehead-structure interface. These equilibrium conditions are usually obtained using an interaction analysis procedure which yields the combined response of the linear structure and its non-linear soil-pile foundation for any imposed static load condition."* (Shebini, column 4, lines 55-65); et cetera. Shebini provides numerous examples of the "technical conditions" that are accumulated in columns 3 and 4]; computing at least one technical characteristic value of the one-piece shape model which is created based on the work history data [*"The equilibrium conditions determined from the interaction analysis are now imposed on the structural Model in combination with appropriate design loads, and a static analysis is performed. The internal member forces determined in this analysis are employed to check the stress levels in the members."* (Shebini, column 4, line 65 - column 5, line 2)]; and

comparing the computed technical characteristic value with technical conditions related to work history data which is the origin of the design work data [*"The stresses are compared to*

allowable stresses, as set forth in the design basis, and members resized accordingly." (Shebini, column 5, lines 2-5)];

wherein the computation of the at least one technical characteristic value comprises analyzing the strength of the one-piece shape model [*"stress levels in the members"* (Shebini, column 4, line 65 - column 5, line 5)].

Sebastian and Shebini are analogous art because both are drawn to structural modeling.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini as expressly motivated by Shebini in order to predict the structural properties of the assembled product [*"Nowadays, by using the Finite Element Method (FEM), stress analysts do not have to modify the problem to conform to available solutions. No matter how complex the shape or system of loads may be, the (FEM) treats a loaded structure as being built of numerous tiny connected substructures or elements as are shown in FIG. 8. Since these elements can be put together in virtually any fashion, they can be arranged in simulate exceedingly complex shapes. Thus, the (FEM) can be used to determine stresses for structural parts where no mathematically closed form solution exists."* (Shebini, column 1, lines 25-35)]. The combination could be achieved by using Shebini's structural analysis method to analyze the model described by Sebastian.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini to arrive at the invention specified in claim 12.

Regarding claim 13, Sebastian teaches:

A design support method which uses a computer to create a shape model of a design target conforming to a desired standard shape according to input to its processor and outputs work data for creating the shape model of the design target [(abstract); (column 11, lines 32-49); (column 12, lines 3-11); (column 13, lines 44-46)], comprising the steps of:

Holding a plurality of histories of design work performed in the past with reference to the respective standard shapes in a database as work history data (column 13, lines 44-46);

Accepting designation of data about a second standard shape, which is a desired standard shape, according to an instruction input to the processor (column 22, lines 21-65);

Fetching the selected multiple work history data from the multiple work history data held in the database (column 22, lines 21-65); and

Combining respective pieces of the fetched work history data, reproducing design work with reference to the designated second standard shape for the design work performed in the past with reference to the respective standard shapes among the design work contained in the work history data, and outputting work data corresponding to a combined shape model conforming to the second standard shape (column 12, lines 3-11); and

creating a corresponding surface group to determine if there are errors in the combined shape model arising from the second reference surface (column 22, line 18, *et seq.*).

Shebini teaches the database accumulating technical conditions, which are to be met by the part shape model to be created according to each work history data, in association with each work history data [*"Turning to very particular structures, namely off-shore platforms, we see that they must be structurally adequate for operational and environmental loading, practical to construct, and be cost effective. The selection of a configuration is based on functional*

requirements and methods of installation." (Shebini, column 3, lines 60-65); "Once environmental loads are determined, they are combined with operational loads, and an estimate is made of the resulting pile mudline moments and axial forces." (Shebini, column 4, lines 33-39); "Before the design solution of either the 3-dimensional "finite Element" analysis of the superstructure and jacket, or the beam-column analysis of the piling can be considered finished, it is necessary to determine compatible conditions at the pilehead-structure interface. These equilibrium conditions are usually obtained using an interaction analysis procedure which yields the combined response of the linear structure and its non-linear soil-pile foundation for any imposed static load condition." (Shebini, column 4, lines 55-65); et cetera. Shebini provides numerous examples of the "technical conditions" that are accumulated in columns 3 and 4];

computing at least one technical characteristic value of the one-piece shape model which is created based on the fetched work history data ["The equilibrium conditions determined from the interaction analysis are now imposed on the structural Model in combination with appropriate design loads, and a static analysis is performed. The internal member forces determined in this analysis are employed to check the stress levels in the members." (Shebini, column 4, line 65 - column 5, line 2)]; and

comparing the computed technical characteristic value with technical conditions related to work history data which is the origin of the design work data ["The stresses are compared to allowable stresses, as set forth in the design basis, and members resized accordingly." (Shebini, column 5, lines 2-5)];

wherein the computation of the at least one technical characteristic value comprises analyzing the strength of the one-piece shape model [*"stress levels in the members"* (Shebini, column 4, line 65 - column 5, line 5)].

Sebastian and Shebini are analogous art because both are drawn to structural modeling.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini as expressly motivated by Shebini in order to predict the structural properties of the assembled product [*"Nowadays, by using the Finite Element Method (FEM), stress analysts do not have to modify the problem to conform to available solutions. No matter how complex the shape or system of loads may be, the (FEM) treats a loaded structure as being built of numerous tiny connected substructures or elements as are shown in FIG. 8. Since these elements can be put together in virtually any fashion, they can be arranged in simulate exceedingly complex shapes. Thus, the (FEM) can be used to determine stresses for structural parts where no mathematically closed form solution exists."* (Shebini, column 1, lines 25-35)]. The combination could be achieved by using Shebini's structural analysis method to analyze the model described by Sebastian.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini to arrive at the invention specified in claim 13.

Regarding claim 14, Sebastian teaches:

A design support method which holds a series of design work histories as work history data in order for reuse and generates a shape by a computer according to the work history data

according to an instruction input to a processor [(abstract); (column 11, lines 32-49); (column 12, lines 3-11); (column 13, lines 44-46)], comprising the steps of:

Analyzing the work history data upon input to the processor to extract the input work performed by a person in charge of work (column 22, lines 21-65);

Showing the extracted input work to the person in charge of work to request input of design support information;

when the design support information is input, recording the design support information in the work history data [(column 11, lines 32-49); (column 22, lines 21-65)]; and

creating a corresponding surface group to determine if there are errors in the extracted input work arising from the second reference surface (column 22, line 18, *et seq.*).

Shebini teaches the database accumulating technical conditions, which are to be met by the part shape model to be created according to each work history data, in association with each work history data [*"Turning to very particular structures, namely off-shore platforms, we see that they must be structurally adequate for operational and environmental loading, practical to construct, and be cost effective. The selection of a configuration is based on functional requirements and methods of installation."* (Shebini, column 3, lines 60-65); *"Once environmental loads are determined, they are combined with operational loads, and an estimate is made of the resulting pile mudline moments and axial forces."* (Shebini, column 4, lines 33-39); *"Before the design solution of either the 3-dimensional "finite Element" analysis of the superstructure and jacket, or the beam-column analysis of the piling can be considered finished, it is necessary to determine compatible conditions at the pilehead-structure interface. These equilibrium conditions are usually obtained using an interaction analysis procedure which yields*

the combined response of the linear structure and its non-linear soil-pile foundation for nay imposed static load condition." (Shebini, column 4, lines 55-65); et cetera. Shebini provides numerous examples of the "technical conditions" that are accumulated in columns 3 and 4];

computing at least one technical characteristic value of the shape which is created based on the fetched work history data ["The equilibrium conditions determined from the interaction analysis are now imposed on the structural Model in combination with appropriate design loads, and a static analysis is performed. The internal member forces determined in this analysis are employed to check the stress levels in the members." (Shebini, column 4, line 65 - column 5, line 2)]; and

comparing the computed technical characteristic value with technical conditions related to work history data ["The stresses are compared to allowable stresses, as set forth in the design basis, and members resized accordingly." (Shebini, column 5, lines 2-5)];

wherein the computation of the at least one technical characteristic value comprises analyzing the strength of the one-piece shape model ["stress levels in the members" (Shebini, column 4, line 65 - column 5, line 5)].

Sebastian and Shebini are analogous art because both are drawn to structural modeling.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini as expressly motivated by Shebini in order to predict the structural properties of the assembled product [*"Nowadays, by using the Finite Element Method (FEM), stress analysts do not have to modify the problem to conform to available solutions. No matter how complex the shape or system of loads may be, the (FEM) treats a loaded structure as being built of numerous tiny connected substructures or*

elements as are shown in FIG. 8. Since these elements can be put together in virtually any fashion, they can be arranged in simulate exceedingly complex shapes. Thus, the (FEM) can be used to determine stresses for structural parts where no mathematically closed form solution exists." (Shebini, column 1, lines 25-35)]. The combination could be achieved by using Shebini's structural analysis method to analyze the model described by Sebastian.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini to arrive at the invention specified in claim 14.

Regarding claim 15, Sebastian teaches:

A design support method, comprising the steps of:

Accumulating, using a computer, unit work history data which is formed by dividing a history of past design work into work units determined for a design target and contains design support information related to input work among the design work;

Showing the unit work history selectively upon receiving designation of the design target by the computer;

Creating a shape by sequentially reproducing the selected unit work history;

Providing the design support information related to input work when the input work is demanded while the unit work history is being reproduced [(abstract); (column 11, lines 32-49); (column 12, lines 3-11); (column 13, lines 44-46); (column 22, lines 21-65). This claim presents a combination of limitations recited by previous claims. These citations of the prior art are explained in more detail in the context of the previous claims.]; and

creating a corresponding surface group to determine if there are errors in the shape arising from the second reference surface (column 22, line 18, *et seq.*).

Shebini teaches the accumulating, using the computer, technical conditions, which are to be met by a part shape model to be created according to each work history data, in association with each work history data [*"Turning to very particular structures, namely off-shore platforms, we see that they must be structurally adequate for operational and environmental loading, practical to construct, and be cost effective. The selection of a configuration is based on functional requirements and methods of installation."* (Shebini, column 3, lines 60-65); *"Once environmental loads are determined, they are combined with operational loads, and an estimate is made of the resulting pile mudline moments and axial forces."* (Shebini, column 4, lines 33-39); *"Before the design solution of either the 3-dimensional "finite Element" analysis of the superstructure and jacket, or the beam-column analysis of the piling can be considered finished, it is necessary to determine compatible conditions at the pilehead-structure interface. These equilibrium conditions are usually obtained using an interaction analysis procedure which yields the combined response of the linear structure and its non-linear soil-pile foundation for any imposed static load condition."* (Shebini, column 4, lines 55-65); et cetera. Shebini provides numerous examples of the "technical conditions" that are accumulated in columns 3 and 4];

computing at least one technical characteristic value of the shape which is created based on the work history data [*"The equilibrium conditions determined from the interaction analysis are now imposed on the structural Model in combination with appropriate design loads, and a static analysis is performed. The internal member forces determined in this analysis are*

employed to check the stress levels in the members." (Shebini, column 4, line 65 - column 5, line 2)]; and

comparing the computed technical characteristic value with technical conditions related to unit work history data [*"The stresses are compared to allowable stresses, as set forth in the design basis, and members resized accordingly." (Shebini, column 5, lines 2-5)]*;

wherein the computation of the at least one technical characteristic value comprises analyzing the strength of the shape [*"stress levels in the members"* (Shebini, column 4, line 65 - column 5, line 5)].

Sebastian and Shebini are analogous art because both are drawn to structural modeling.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini as expressly motivated by Shebini in order to predict the structural properties of the assembled product [*"Nowadays, by using the Finite Element Method (FEM), stress analysts do not have to modify the problem to conform to available solutions. No matter how complex the shape or system of loads may be, the (FEM) treats a loaded structure as being built of numerous tiny connected substructures or elements as are shown in FIG. 8. Since these elements can be put together in virtually any fashion, they can be arranged in simulate exceedingly complex shapes. Thus, the (FEM) can be used to determine stresses for structural parts where no mathematically closed form solution exists." (Shebini, column 1, lines 25-35)]*. The combination could be achieved by using Shebini's structural analysis method to analyze the model described by Sebastian.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini to arrive at the invention specified in claim 15.

Regarding claim 16, Sebastian teaches wherein it is judged whether the work history to be reproduced conforms to predetermined guidance display conditions while the unit work history data is being reproduced by the computer and, if it conforms to the guidance display conditions, a guidance display determined in connection with the guide display conditions is performed (column 22, lines 21-65).

Regarding claim 17, Sebastian teaches a recording medium storing a design support program and being computer-readable, the design support program comprising:

A module holding a series of design work histories as a plurality of work history data for creation of a part shape model [(abstract); (column 11, lines 32-49); (column 12, lines 3-11); (column 13, lines 44-46)];

A module fetching at least two selected work history data from the held multiple work history data (column 22, lines 21-65); and

A module for outputting design work data for creating a one-piece shape model by combining the at least two fetched work history data and connecting part shape models corresponding to the respective work history data (column 12, lines 3-11); and

a module creating a corresponding surface group in accordance with user input of a correspondence to determine if there are errors in the part shape model arising from the second reference surface (column 22, line 18, *et seq.*).

Shebini teaches a module accumulating technical conditions, which are to be met by a part shape model [*"Turning to very particular structures, namely off-shore platforms, we see that they must be structurally adequate for operational and environmental loading, practical to construct, and be cost effective. The selection of a configuration is based on functional requirements and methods of installation."* (Shebini, column 3, lines 60-65); *"Once environmental loads are determined, they are combined with operational loads, and an estimate is made of the resulting pile mudline moments and axial forces."* (Shebini, column 4, lines 33-39); *"Before the design solution of either the 3-dimensional "finite Element" analysis of the superstructure and jacket, or the beam-column analysis of the piling can be considered finished, it is necessary to determine compatible conditions at the pilehead-structure interface. These equilibrium conditions are usually obtained using an interaction analysis procedure which yields the combined response of the linear structure and its non-linear soil-pile foundation for any imposed static load condition."* (Shebini, column 4, lines 55-65); et cetera. Shebini provides numerous examples of the "technical conditions" that are accumulated in columns 3 and 4];

a module computing at least one technical characteristic value of the one-piece shape model which is created from the design work data [*"The equilibrium conditions determined from the interaction analysis are now imposed on the structural Model in combination with appropriate design loads, and a static analysis is performed. The internal member forces*

determined in this analysis are employed to check the stress levels in the members." (Shebini, column 4, line 65 - column 5, line 2)]; and

a module comparing the computed technical characteristic value with technical conditions related to unit work history data which is the origin of the design work data ["The stresses are compared to allowable stresses, as set forth in the design basis, and members resized accordingly." (Shebini, column 5, lines 2-5)];

wherein the computation of the at least one technical characteristic value comprises analyzing the strength of the one-piece shape model ["stress levels in the members" (Shebini, column 4, line 65 - column 5, line 5)].

Sebastian and Shebini are analogous art because both are drawn to structural modeling.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini as expressly motivated by Shebini in order to predict the structural properties of the assembled product ["Nowadays, by using the Finite Element Method (FEM), stress analysts do not have to modify the problem to conform to available solutions. No matter how complex the shape or system of loads may be, the (FEM) treats a loaded structure as being built of numerous tiny connected substructures or elements as are shown in FIG. 8. Since these elements can be put together in virtually any fashion, they can be arranged in simulate exceedingly complex shapes. Thus, the (FEM) can be used to determine stresses for structural parts where no mathematically closed form solution exists." (Shebini, column 1, lines 25-35)]. The combination could be achieved by using Shebini's structural analysis method to analyze the model described by Sebastian.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini to arrive at the invention specified in claim 17.

Regarding claim 18, Sebastian teaches:

A recording medium storing a design support program and being computer-readable, the design support program comprising:

A module outputting work data for creating a shape model of a design target in order to create the shape model of the design target conforming to a desired standard shape [(column 11, lines 32-49); (column 12, lines 3-11)];

A module holding a history of design work performed with reference to a first standard shape as a plurality of work history data [(column 11, lines 32-49); (column 12, lines 3-11)];

A module receiving designation of data about a second standard shape which is a desired standard shape [(column 11, lines 32-49); (column 12, lines 3-11)];

A module fetching the selected multiple work history data from the held multiple work history data (column 22, lines 21-65); and

A module combining each of the fetched work history data, reproducing design work with reference to the designated second standard shape for the design works performed with reference to the first standard shape among the design works contained in the work history data, and outputting work data corresponding to a one-piece shape model conforming to the second standard shape [(abstract); (column 11, lines 32-49); (column 12, lines 3-11); (column 13, lines 44-46); (column 22, lines 21-65)]. This claim presents a combination of limitations recited by

previous claims. These citations of the prior art are explained in more detail in the context of the previous claims.]; and

a module creating a corresponding surface group in accordance with user input of a correspondence to determine if there are errors in the second standard shape caused by the second reference surface (column 22, line 18, *et seq.*).

Shebini teaches a module accumulating technical conditions, which are to be met by a part shape model [*"Turning to very particular structures, namely off-shore platforms, we see that they must be structurally adequate for operational and environmental loading, practical to construct, and be cost effective. The selection of a configuration is based on functional requirements and methods of installation."* (Shebini, column 3, lines 60-65); *"Once environmental loads are determined, they are combined with operational loads, and an estimate is made of the resulting pile mudline moments and axial forces."* (Shebini, column 4, lines 33-39); *"Before the design solution of either the 3-dimensional "finite Element" analysis of the superstructure and jacket, or the beam-column analysis of the piling can be considered finished, it is necessary to determine compatible conditions at the pilehead-structure interface. These equilibrium conditions are usually obtained using an interaction analysis procedure which yields the combined response of the linear structure and its non-linear soil-pile foundation for any imposed static load condition."* (Shebini, column 4, lines 55-65); et cetera. Shebini provides numerous examples of the "technical conditions" that are accumulated in columns 3 and 4];

a module computing at least one technical characteristic value of the one-piece shape model which is created from the design work [*"The equilibrium conditions determined from the interaction analysis are now imposed on the structural Model in combination with appropriate*

design loads, and a static analysis is performed. The internal member forces determined in this analysis are employed to check the stress levels in the members." (Shebini, column 4, line 65 - column 5, line 2); and

a module comparing the computed technical characteristic value with technical conditions related to unit work history data which is the origin of the design work data [*"The stresses are compared to allowable stresses, as set forth in the design basis, and members resized accordingly.*" (Shebini, column 5, lines 2-5)];

wherein the computation of the at least one technical characteristic value comprises analyzing the strength of the one-piece shape model [*"stress levels in the members"* (Shebini, column 4, line 65 - column 5, line 5)].

Sebastian and Shebini are analogous art because both are drawn to structural modeling.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini as expressly motivated by Shebini in order to predict the structural properties of the assembled product [*"Nowadays, by using the Finite Element Method (FEM), stress analysts do not have to modify the problem to conform to available solutions. No matter how complex the shape or system of loads may be, the (FEM) treats a loaded structure as being built of numerous tiny connected substructures or elements as are shown in FIG. 8. Since these elements can be put together in virtually any fashion, they can be arranged in simulate exceedingly complex shapes. Thus, the (FEM) can be used to determine stresses for structural parts where no mathematically closed form solution exists.*" (Shebini, column 1, lines 25-35)]. The combination could be achieved by using Shebini's structural analysis method to analyze the model described by Sebastian.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini to arrive at the invention specified in claim 18.

Regarding claim 19, Sebastian teaches:

A recording medium storing a design support program and being computer-readable, the design support program comprising:

A module holding a series of design work histories to reuse as a work history data (column 13, lines 44-46);

A module analyzing the work history data to extract input work performed by a person in charge of work (column 22, lines 21-65);

A module showing the extracted input work to the person in charge of work to receive input of design support information (column 22, lines 21-65); and

A module recording the design support information in the work history data when the design support information is input (column 22, lines 21-65); and

a module creating a corresponding surface group in accordance with user input of a correspondence to determine if there are errors in the extracted input work arising from the second reference surface (column 22, line 18, *et seq.*).

Shebini teaches a module accumulating technical conditions, which are to be met by a part shape model to be created according to each work history data, in association with each work history data [*"Turning to very particular structures, namely off-shore platforms, we see that they must be structurally adequate for operational and environmental loading, practical to*

construct, and be cost effective. The selection of a configuration is based on functional requirements and methods of installation." (Shebini, column 3, lines 60-65); "Once environmental loads are determined, they are combined with operational loads, and an estimate is made of the resulting pile mudline moments and axial forces." (Shebini, column 4, lines 33-39); "Before the design solution of either the 3-dimensional "finite Element" analysis of the superstructure and jacket, or the beam-column analysis of the piling can be considered finished, it is necessary to determine compatible conditions at the pilehead-structure interface. These equilibrium conditions are usually obtained using an interaction analysis procedure which yields the combined response of the linear structure and its non-linear soil-pile foundation for any imposed static load condition." (Shebini, column 4, lines 55-65); et cetera. Shebini provides numerous examples of the "technical conditions" that are accumulated in columns 3 and 4];

a module computing at least one technical characteristic value of the extracted input work which is created from the work history data ["The equilibrium conditions determined from the interaction analysis are now imposed on the structural Model in combination with appropriate design loads, and a static analysis is performed. The internal member forces determined in this analysis are employed to check the stress levels in the members." (Shebini, column 4, line 65 - column 5, line 2)]; and

a module comparing the computed technical characteristic value with technical conditions related to work history data ["The stresses are compared to allowable stresses, as set forth in the design basis, and members resized accordingly." (Shebini, column 5, lines 2-5)];

wherein the computation of the at least one technical characteristic value comprises analyzing the strength of the extracted input work [*"stress levels in the members"* (Shebini, column 4, line 65 - column 5, line 5)].

Sebastian and Shebini are analogous art because both are drawn to structural modeling.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini as expressly motivated by Shebini in order to predict the structural properties of the assembled product [*"Nowadays, by using the Finite Element Method (FEM), stress analysts do not have to modify the problem to conform to available solutions. No matter how complex the shape or system of loads may be, the (FEM) treats a loaded structure as being built of numerous tiny connected substructures or elements as are shown in FIG. 8. Since these elements can be put together in virtually any fashion, they can be arranged in simulate exceedingly complex shapes. Thus, the (FEM) can be used to determine stresses for structural parts where no mathematically closed form solution exists."* (Shebini, column 1, lines 25-35)]. The combination could be achieved by using Shebini's structural analysis method to analyze the model described by Sebastian.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini to arrive at the invention specified in claim 19.

Regarding claim 20, Sebastian teaches:

A recording medium storing a design support program and being computer-readable, the design support program comprising:

A module accumulating unit work history data which is formed by dividing a history of past design work into work units determined for a design target and contains design support information related to input work among the design work [(abstract); (column 11, lines 32-49); (column 12, lines 3-11); (column 13, lines 44-46)];

A module selectively showing the unit work history upon receiving designation of the design target (column 22, lines 21-65);

A module creating a shape by sequentially reproducing the selected unit work history [(column 11, lines 32-49); (column 12, lines 3-11)]; and

A module providing design support information related to an input work when the input work is demanded while the unit work history is being reproduced (column 16, lines 19-47); and

a module creating a corresponding surface group in accordance with user input of a correspondence to determine if there are errors in the shape arising from the second reference surface (column 22, line 18, *et seq.*).

Shebini teaches a module accumulating technical conditions, which are to be met by a part shape model to be created according to each unit work history data, in association with each unit work history data [*"Turning to very particular structures, namely off-shore platforms, we see that they must be structurally adequate for operational and environmental loading, practical to construct, and be cost effective. The selection of a configuration is based on functional requirements and methods of installation."* (Shebini, column 3, lines 60-65); *"Once environmental loads are determined, they are combined with operational loads, and an estimate is made of the resulting pile mudline moments and axial forces."* (Shebini, column 4, lines 33-39); *"Before the design solution of either the 3-dimensional "finite Element" analysis of the*

superstructure and jacket, or the beam-column analysis of the piling can be considered finished, it is necessary to determine compatible conditions at the pilehead-structure interface. These equilibrium conditions are usually obtained using an interaction analysis procedure which yields the combined response of the linear structure and its non-linear soil-pile foundation for nay imposed static load condition." (Shebini, column 4, lines 55-65); et cetera. Shebini provides numerous examples of the "technical conditions" that are accumulated in columns 3 and 4];

a module computing at least one technical characteristic value of the shape which is created from the work history data ["The equilibrium conditions determined from the interaction analysis are now imposed on the structural Model in combination with appropriate design loads, and a static analysis is performed. The internal member forces determined in this analysis are employed to check the stress levels in the members." (Shebini, column 4, line 65 - column 5, line 2)]; and

a module comparing the computed technical characteristic value with technical conditions related to work history data ["The stresses are compared to allowable stresses, as set forth in the design basis, and members resized accordingly." (Shebini, column 5, lines 2-5)];

wherein the computation of the at least one technical characteristic value comprises analyzing the strength of the shape ["stress levels in the members" (Shebini, column 4, line 65 - column 5, line 5)].

Sebastian and Shebini are analogous art because both are drawn to structural modeling.

It would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini as expressly motivated by Shebini in order to predict the structural properties of the assembled product ["Nowadays, by

using the Finite Element Method (FEM), stress analysts do not have to modify the problem to conform to available solutions. No matter how complex the shape or system of loads may be, the (FEM) treats a loaded structure as being built of numerous tiny connected substructures or elements as are shown in FIG. 8. Since these elements can be put together in virtually any fashion, they can be arranged in simulate exceedingly complex shapes. Thus, the (FEM) can be used to determine stresses for structural parts where no mathematically closed form solution exists." (Shebini, column 1, lines 25-35)]. The combination could be achieved by using Shebini's structural analysis method to analyze the model described by Sebastian.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of Applicants' invention to combine the teachings of Sebastian and Shebini to arrive at the invention specified in claim 20.

Regarding claim 21, Sebastian teaches:

The recording medium being computer-readable according to claim 20, wherein:

The design support program stored in the recording medium further includes a module judging whether the work history to be reproduced agrees with predetermined guidance display conditions while the unit work history is being reproduced and, if the work history agrees with the guidance display conditions, implements a guidance display determined in connection with the conditions [(column 16, lines 19-47); (column 22, lines 21-65)].

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Proctor whose telephone number is (571) 272-3713. The examiner can normally be reached on 8:30 am-4:30 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR)

system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Jason Proctor/
Primary Examiner, Art Unit 2123

jsp